

D-A237 981



COESAM/PDFC-88/06

DTIC

ELECTE

JUL 01 1991

(2)

ECONOMIC REANALYSES
FOR
NAVIGATION IMPROVEMENTS
AT
Bayou La Batre, Alabama



**US Army Corps
of Engineers
Mobile District
South Atlantic Division**

APPENDIX F

12 SEPT 88

CWIS #10068

91-03744



REPORT DOCUMENTATION PAGE		READ INSTRUCTIONS BEFORE COMPLETING FORM
1. REPORT NUMBER COESAM/PDFC-88/06	2. GOVT ACCESSION NO.	3. RECIPIENT'S CATALOG NUMBER
4. TITLE (and Subtitle) Economic Reanalyses for Navigation Improvements at Bayou La Batre, Alabama Appendix F		5. TYPE OF REPORT & PERIOD COVERED Final Feasibility Report Sep 1988
		6. PERFORMING ORG. REPORT NUMBER
7. AUTHOR(s) John K. Graham Evelyn Brown		8. CONTRACT OR GRANT NUMBER(s)
9. PERFORMING ORGANIZATION NAME AND ADDRESS U.S. ARMY ENGINEER DISTRICT, MOBILE COASTAL SECTION, PLANNING DIVISION (CESAM-PD-FC) P.O. BOX 2288, MOBILE, AL 36628-0001		10. PROGRAM ELEMENT, PROJECT, TASK AREA & WORK UNIT NUMBERS
11. CONTROLLING OFFICE NAME AND ADDRESS CESAM-PD-FC P.O. BOX 2288 MOBILE, AL 36628-0001		12. REPORT DATE SEP 1988
		13. NUMBER OF PAGES 34
14. MONITORING AGENCY NAME & ADDRESS (if different from Controlling Office)		15. SECURITY CLASS. (of this report) Unclassified
		15a. DECLASSIFICATION/DOWNGRADING SCHEDULE N/A
16. DISTRIBUTION STATEMENT (of this Report) Approved for public release, distribution unlimited.		
17. DISTRIBUTION STATEMENT (of the abstract entered in Block 20, if different from Report)		
18. SUPPLEMENTARY NOTES		
19. KEY WORDS (Continue on reverse side if necessary and identify by block number) NAVIGATION BAYOU LA BATRE FEASIBILITY COMMERCIAL FISHING BUTTERFISH		
20. ABSTRACT (Continue on reverse side if necessary and identify by block number) The report consists of an economic reanalysis for channel improvements at Bayou La Batre, Alabama.		

SYLLABUS

The Draft Feasibility Study and Report on Navigation Improvements at Bayou La Batre, Alabama was completed in April 1988. This project study was selected as the first project to be tested under the new Washington level review process which was designed to reduce the time required for review of Corps of Engineers study reports. This process consists of concurrent review by the Office of the Assistant Secretary of the Army for Civil Works (OASA/CW), Office of the Chief of Engineers (OCE), and the Washington Level Review Center (WLRC).

As a result of comments received during the Issue Resolution Conference (IRC), and Washington level review of the project, it became necessary to revise the National Economic Development benefits of the project. This reevaluation included commercial shrimping, shipbuilding split operations, and butterfly landings.

Appendix F, therefore, was developed after extensive coordination between Mobile District, and the Washington Level Review Center to resolve the issues and concerns raised during the final review of the Bayou La Batre Feasibility Report. Accordingly, Appendix F contains the final economic analysis relative to commercial shrimping, shipbuilding split operations, butterfly fishing, and the plan formulation for the project.

Accession Ver	
ST 1000001	<input checked="" type="checkbox"/>
DTIC Tab	<input type="checkbox"/>
Unannounced	<input type="checkbox"/>
Justification	
By	
Distribution	
Availability Codes	
Dist	Avail and/or Special
A-1	

APPENDIX F

BAYOU LA BATRE, ALABAMA FEASIBILITY REPORT ON IMPROVEMENT OF THE EXISTING FEDERAL NAVIGATION CHANNEL

ECONOMIC REANALYSES OF BUTTERFISHING, SHIPBUILDING AND SHRIMPING

CONTENTS

	Page
I. INTRODUCTION.	F-1
II. BUTTERFISH.	F-2
A. <u>GENERAL</u>	F-2
B. <u>EXISTING CONDITION</u>	F-5
1. <u>Vessel Operating Costs</u>	F-5
2. <u>Vessel Damages</u>	F-7
3. <u>Diver Costs</u>	F-7
4. <u>Vessel Delay Costs</u>	F-7
5. <u>Opportunity Costs to Labor</u>	F-7
C. <u>FUTURE WITHOUT PROJECT CONDITION</u>	F-8
1. <u>General</u>	F-8

APPENDIX F
BAYOU LA BATRE, ALABAMA
FEASIBILITY REPORT
ON
IMPROVEMENT OF THE EXISTING
FEDERAL NAVIGATION CHANNEL

CONTENTS

	Page
2. <u>Future Without Project Condition Costs to Catch Butterfish.</u>	F-10
D. <u>FUTURE WITH PROJECT CONDITION.</u>	F-12
1. <u>General.</u>	F-12
2. <u>14-Foot Channel.</u>	F-15
3. <u>16-Foot Channel.</u>	F-15
4. <u>18-Foot Channel.</u>	F-17
5. <u>20-Foot and 22-Foot Channels.</u>	F-18
6. <u>Summary of Average Annual Costs and Benefits for Butterfish.</u>	F-18
III. <u>SHIPBUILDING, SPLIT OPERATIONS.</u>	F-20
A. <u>GENERAL.</u>	F-20
B. <u>EXISTING CONDITION.</u>	F-21
C. <u>FUTURE WITHOUT PROJECT CONDITION.</u>	F-21
D. <u>FUTURE WITH PROJECT CONDITION.</u>	F-22
1. <u>Service and Repair of Oil Industry Vessels.</u> .	F-22
2. <u>Construction and Repair of Large Vessels.</u> ...	F-22
E. <u>AVERAGE ANNUAL COSTS AND BENEFITS.</u>	F-24
IV. <u>COMMERCIAL FISHING, SHRIMP.</u>	F-25
A. <u>GENERAL.</u>	F-25
B. <u>EXISTING CONDITION.</u>	F-26

APPENDIX F
BAYOU LA BATRE, ALABAMA
FEASIBILITY REPORT
ON
IMPROVEMENT OF THE EXISTING
FEDERAL NAVIGATION CHANNEL

CONTENTS

	Page
C. <u>FUTURE WITHOUT PROJECT CONDITION</u>	F-26
D. <u>FUTURE WITH PROJECT CONDITION</u>	F-27
V. SUMMARY OF WITH PROJECT CONDITION COSTS AND BENEFITS. . .	F-28
A. <u>GENERAL</u>	F-28
B. <u>14-FOOT CHANNEL</u>	F-28
C. <u>16-FOOT CHANNEL</u>	F-28
D. <u>18-FOOT CHANNEL</u>	F-28
E. <u>20-FOOT AND 22-FOOT CHANNELS</u>	F-28
VI. PLAN FORMULATION.	F-31
A. <u>GENERAL</u>	F-31
B. <u>PLAN FORMULATION</u>	F-31
C. <u>RECOMMENDED PLAN</u>	F-33

APPENDIX F

BAYOU LA BATRE, ALABAMA FEASIBILITY REPORT ON IMPROVEMENT OF THE EXISTING FEDERAL NAVIGATION CHANNEL

I. INTRODUCTION.

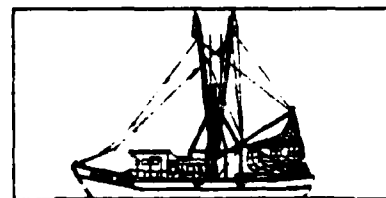
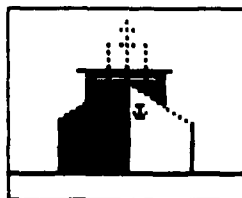
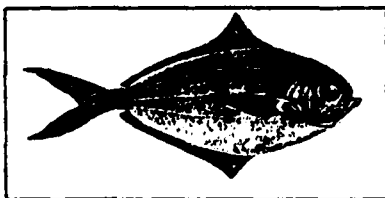
A. GENERAL. This appendix to the Bayou La Batre Feasibility Report contains revisions to Appendix B, Economic Analysis. The major areas of revision include the economic analyses for butterfishing, shipbuilding split operations, and shrimping. The revisions presented herein are the result of review and coordination between the Washington Level Review Center staff, South Atlantic Division and Mobile District Office staff, National Marine Fisheries Service, Bayou La Batre commercial fishing and shipbuilding interests, and other sources.

These analyses resulted in no change to the recommended plan for the project. The recommended plan is described on pages F-33 and F-34 of this appendix and is the same as that described on pages 87-95 of the Final Feasibility Report.

B. BUTTERFISH. The butterfish analysis has been completely revised from that presented in Appendix B. The reanalysis presented on pages F-2 through F-19 of this appendix, completely replaces the butterfish analysis contained on pages B-31 through B-35 and pages B-48 and B-49 of Appendix B.

C. SHIPBUILDING, SPLIT OPERATIONS. The shipbuilding split operations analysis has been totally revised over that presented in Appendix B. The reanalysis presented on pages F-20 through F-24 of this appendix replaces the split operations analysis contained on pages B-37 through B-40 of Appendix B.

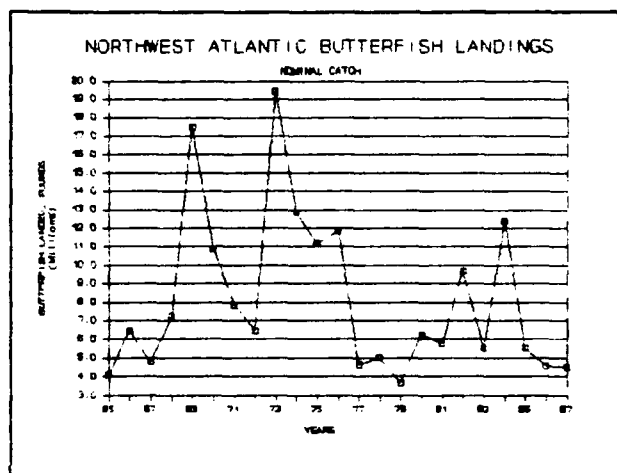
D. COMMERCIAL FISHING, SHRIMP. The major revisions to the commercial fishing analysis, presented on pages F-25 through F-27, concern the future without and with project scenarios. Based upon information from the National Marine Fisheries Service, the shrimp catch within the Gulf of Mexico has been held constant at existing levels for future years rather than increased to the projected maximum probable catch.



II. BUTTERFISH.

A. GENERAL. The Gulf butterfish, *Peprilus burti*, has been found to be one of the most promising latent fishery resources within the Gulf of Mexico. A commercial fishery exists in the Middle Atlantic Bight for a very similar species, the Atlantic butterfish, *Peprilus triacanthus*¹. This butterfishing industry has included domestic fishermen from the New England coast as well as the fleets of foreign nations. Most of the Atlantic catch, which peaked at 19,454 metric tons (42.8 million pounds) in 1973, is marketed overseas, primarily in Japan. Landings of Atlantic butterfish have fluctuated greatly from year to year for reasons not well understood². Thus, demand for butterfish has not always been met by the U.S. East Coast butterfish industry.

It is expected that the butterfish industry will become a significant commercial fishing activity within the Gulf of Mexico, based upon the results of research efforts conducted by the National Marine Fisheries Service (NMFS) research lab at Pascagoula, Mississippi. The objectives of the research were to 1) examine the methods used in commercial butterfishing, 2) determine the availability of gulf butterfish using commercial methods, and 3) determine whether the resource could be marketed successfully³.



The research began in the fall of 1984 with the NMFS vessel "Chapman" and the Japanese research vessel "Nisshan Maru" conducting exploratory trawling for butterfish within the Gulf of Mexico. The research effort was joined by three New England commercial freezer-trawlers and a converted large shrimp trawler owned by Deep Sea Foods, Inc., of Bayou La Batre. The New

¹Murawski and Waring, 1979.

²Murawski et al., 1978.

³Commercial Fishing for Gulf Butterfish, *Peprilus burti*, in the Gulf of Mexico, Vecchione, Michael, 1988.

England freezer-trawlers landed over a million pounds each year in 1986 and 1987. These butterfish were exported to Japan where they appeared to enjoy relatively good market acceptance⁴. While several gulf coast fishing companies expressed an interest in fishing for butterfish, only Deep Sea Foods, Inc. of Bayou La Batre conducted effective trials⁵.

The Japanese prefer the butterfish packaged in "swim packs" in which frozen fish of uniform size are neatly arranged to make a more aesthetic display. Freshness and appearance of the product is extremely critical to successfully marketing the fish and obtaining optimum prices in Japan. Deep Sea Foods, Inc. has determined that preserving the catch in an ice slurry or refrigerated sea water, rather than freezing the fish aboard the vessel, and processing and freezing the fish at their facility at Bayou La Batre results in a product of highest quality and acceptance.

The greatest catches of Gulf butterfish were made while bottom trawling during daylight hours, as is the catch pattern for the Atlantic butterfish. It is expected that the fish aggregate close to the bottom during the day and move up in the water column during the night to feed and perhaps to spawn. It was also discovered during the test that the large catches of marketable butterfish all came from the outer continental shelf, in waters deeper than 150 m, which is not trawled for the more commonly harvested species within the Gulf of Mexico. Additionally, these catches were made directly south of Bayou La Batre, east of the Mississippi River delta of Louisiana and west of Panama City, Florida. See Figure 1.

Based upon the results of the test, NMFS estimates that, out of a potential 124,000 metric ton (273 million pounds) biomass, an 80 million pounds/year safe harvest of butterfish from the Gulf of Mexico could be conducted. NMFS further projects that future annual butterfish landings from the Gulf of Mexico will total 64 million pounds⁶. No predictions have been made as to how quickly the 64 million pounds/year level of harvest would be reached as this will be largely influenced by the demand for butterfish within the world market. Fisheries experts are

⁴The Retrofit and Butterfish Fishing of the Mister Jug, Dufrene, Ronald, December 1988.

⁵Ibid.

⁶National Marine Fisheries Service letter, January 4, 1989.

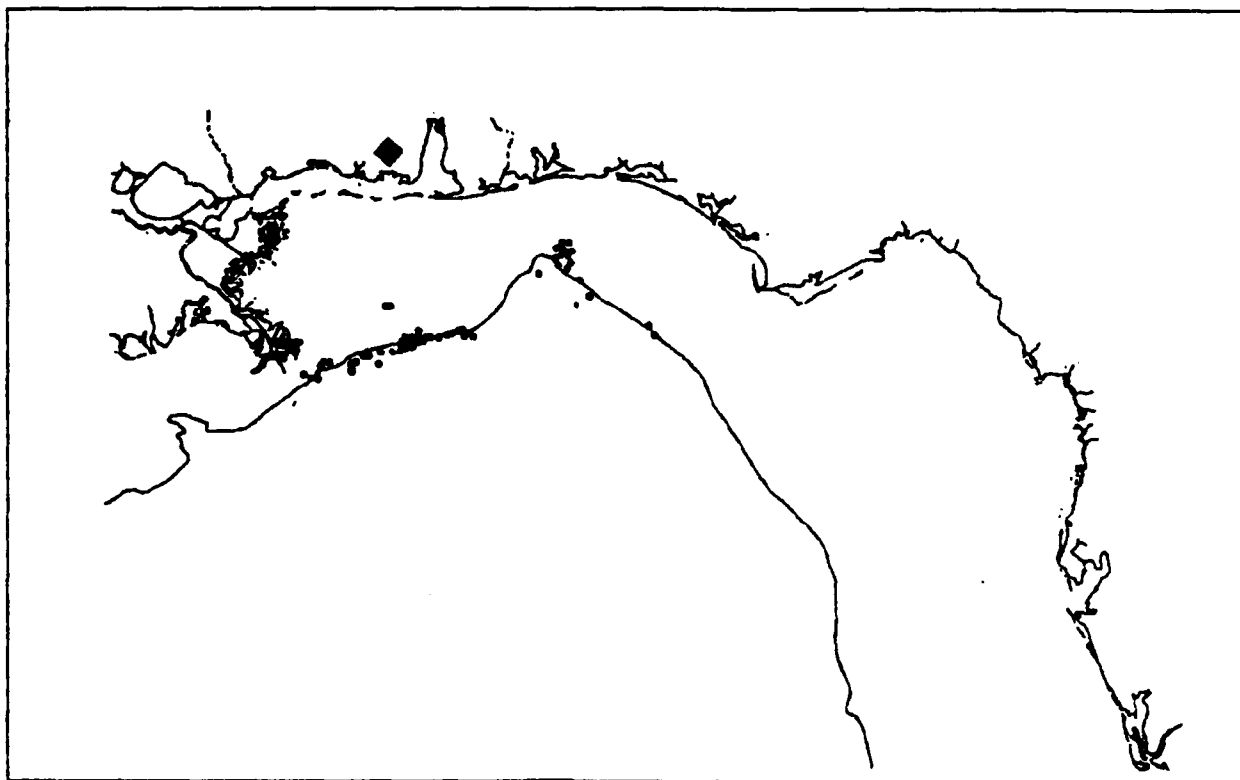


Figure 1

optimistic that the demand for butterfish will grow along with the demand of other fishery products.

The conclusions and recommendations from the Gulf butterfish test were:

- o It is possible to catch Gulf butterfish in quantities and sizes which are commercially valuable.
- o Commercial butterfishing in the Gulf of Mexico should concentrate on daytime bottom trawling on the outer continental shelf in waters deeper than 150 m.
- o Local vessels could be rigged with relative ease to catch Gulf butterfish. Such conversions could be made so that local vessels could shrimp during part of the year and butterfish to supplement their income.
- o It is expected that the Gulf butterfish of marketable size could be caught throughout a 10-month season, February through October, with the peak season for landings occurring from February to May.

- o Processing the catch could be a substantial problem. Because of extended running times between deep water and ports with freezer facilities, techniques such as seawater/ice slurry are less viable as a processing option in areas with a wide continental shelf than for those areas with a relatively narrow shelf.
- o Deep-water trawling a great distance from port would require large vessels of 100 feet or more. Therefore, only the largest local vessels should be considered for conversion to butterfish fishing⁷

B. EXISTING CONDITION. Commercial fishing and test trawling for Gulf butterfish continued through the 1988 season with six New England freezer-trawlers and 10 converted shrimp trawlers from the gulf fleet fishing for butterfish. Deep Sea Foods, Inc. of Bayou la Batre continued its butterfish operations with a converted shrimp trawler. No precise data are available concerning the amount of butterfish landed at Bayou La Batre during the 1988 season; however, the total amount of butterfish caught and marketed from the Gulf of Mexico was 10 to 12 million pounds. The 1988 fishing trips were also of shorter duration than in previous years, owing to increasing ability to locate schools of butterfish utilizing satellite imagery of water surface temperature and other techniques.

The converted shrimp trawler operating out of Bayou La Batre is an 88-foot long, 12-foot draft vessel, capable of hauling 50,000 lbs. of butterfish fully loaded; however, the average catch per trip is 30,000 lbs. The average trip duration is 3 days at sea with a 3-day turnaround. The 3-day turnaround allows for unloading the vessel, repairs, resupply, crew rest, and occasional storm conditions; therefore, the vessel is capable of making 51 trips over a 10-month, 304-day, season. Since the butterfish operations currently remain in a testing phase, complete data concerning vessel operating costs and other costs of butterfishing are not available. However, Deep Sea Foods, Inc. and other data sources have been utilized to develop the following costs for existing butterfish operations.

1. Vessel Operating Costs. Table I presents the fixed and variable operating costs computed for a converted shrimp trawler butterfishing out of Bayou La Batre. These costs per vessel total \$468,000 per year or \$9,176 per trip based upon the capability of the vessel to make 51 trips during a 10-month butterfish season.

⁷Commercial Fishing for Gulf Butterfish, *Peprilus burti*, in the Gulf of Mexico, 1988, op. cit.

TABLE I
ANNUAL COSTS
CONVERTED SHRIMP TRAWLER, BUTTERFISHING
OPERATING OUT OF BAYOU LA BATRE, ALABAMA

CATCH/VESSEL/YEAR

Catch/ Trip lbs.	Number Trips/ Year*	Trip Days/ Year 3 d/trip**
30,000	51	153

* Based on 6 days/trip w/ 3-day turnaround. 304-day season.

** Based on time at sea.

VARIABLE COSTS/VESSEL/YEAR

Fuel Expense ¹	Effort Expense ²	Crew Share ³	Captain's Share ⁴	Other Expense ⁵	Total Var. Costs
\$85,680	\$68,850	\$96,000	\$32,000	\$45,900	\$328,430

FIXED COSTS/VESSEL/YEAR⁶

Total Fixed Costs	Percent of Total Cost	TOTAL COST/TRIP
\$140,000	30%	\$9,176

TOTAL COSTS : \$468,430

ROUNDED : \$468,000

¹ Based upon 70 hours running time per trip, 30 gal/hr, and \$0.80 per gallon = \$1680 per trip / 3 days per trip = \$560/ trip day fuel expense. Source: Deep Sea Foods, Inc.

² Based upon \$450 per trip day. \$80 per trip day from Table 6, pg. B-15, includes engine repair and maintenance, boat repair, etc. \$82,489 - \$63,013(fuel) = \$19,476 / 252 days = \$80/day. Additionally, \$1100 ice per trip/3 days per trip = \$370/day. \$370 + \$80 = \$450.

³ Deep Sea Foods, Inc.

⁴ Deep Sea Foods, Inc.

⁵ Based upon \$300 per trip day. Includes food, other supplies, and return to management.

⁶ Fixed costs = 30% of total costs. Based upon U.S. International Trade Commission Report, Conditions of Competition Affecting the U.S. Gulf and Atlantic Shrimp Industry., 1985.

2. Vessel Damages. The cost of vessel damages to the converted shrimp trawler is consistent with the damages experienced by conventional, 12-foot draft, shrimp trawlers. From Table 10, page B-25, Appendix B of the Final Feasibility Report for Bayou La Batre, the average yearly damages per vessel are \$4,771 or about \$94 per vessel trip.

3. Diver Costs. From Table 11, page B-26, Appendix B of the Final Feasibility Report for Bayou La Batre, the average yearly diver costs for all 12-foot draft vessels is \$43,500. There are presently 66 shrimp trawlers within the Bayou La Batre fleet which draft 12 feet; therefore, the average yearly diver cost per vessel is \$659. The diver cost for the converted shrimp trawlers used for butterfishing is expected to be the same as that of a conventional shrimp trawler, \$13 per vessel trip.

4. Vessel Delay Costs. The potential vessel delay costs for converted shrimp trawlers used for butterfishing was computed consistent with those of conventional shrimp trawlers. See pages B-22 through B-24, Appendix B, Final Feasibility Report. A 12-foot draft vessel averaged about 9 hours delay per trip during the winter months of November through February due to frequent low tides. A converted shrimp trawler used for butterfishing would make 10 trips during November and February (it is not expected that butterfishing will occur in December and January of each year) and would be delayed a total of 90 hours during those two months. Each trip would comprise 3 days or 72 hours at sea. The annual variable vessel operating costs, excluding crew and captain's share, total \$200,430, see Table I. The number of hours at sea each year total 3,672 (51 trips x 3 days ea. x 24 hrs/day = 3,672); therefore, the applicable variable cost per hour is \$54.58. The annual vessel delay costs per converted shrimp trawler total \$4,912.20 (90 hrs. x \$54.58) or \$96 per vessel trip.

5. Opportunity Costs to Labor. These costs are also computed consistently with the opportunity costs to labor for conventional shrimp trawlers. See pages B-26 and B-27, Appendix B, Final Feasibility Report. The annual crew and captain's share aboard a converted shrimp trawler used for butterfishing is \$128,000 (see Table I). The hourly value of this share is \$34.86 (\$128,000/3672 hrs. per year). At 90 hours delay per year, the opportunity costs total \$3,137.40 per vessel per year or \$62 per vessel trip.

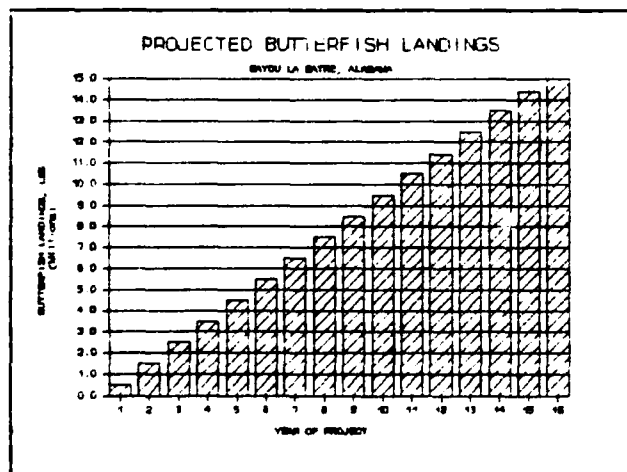
The existing condition costs associated with butterfishing with a converted shrimp trawler out of Bayou La Batre are summarized in Table II.

TABLE II
SUMMARY OF COSTS, EXISTING CONDITION
BUTTERFISHING WITH CONVERTED SHRIMP TRAWLERS
COSTS PER VESSEL PER YEAR

Vessel Operating Costs	\$468,000
Vessel Damages	4,771
Diver Costs	659
Vessel Delay Costs	4,912
Opportunity Costs to Labor	3,137
TOTAL	\$473,479

C. FUTURE WITHOUT PROJECT CONDITION.

1. General. The development of the future without project condition for butterfishing within the Gulf of Mexico and for Bayou La Batre incorporated the most recent and reliable data which could be obtained from the National Marine Fisheries Service, commercial fishing industry representatives, and from independent researchers. Since the butterfishing industry for the Gulf of Mexico and for Bayou La Batre is still in the development and testing phase, there is little historical data relating to operational patterns of the butterfishing industry. Therefore, the future without project condition is based upon consensus in terms of expected harvest of butterfish from the Gulf of Mexico, quantity of landings at Bayou La Batre, and the Bayou La Batre butterfish fleet operational patterns and costs. The following are the major premises used in developing the future without project condition for the butterfish industry at Bayou La Batre.



- o Butterfish landings at Bayou la Batre will increase from 500,000 pounds in the first year of the project to 15 million pounds over a 15-year period and remain at that level for the remainder of the 50-year project life.
- o Due to the depth restriction of the existing 12-foot channel, the Bayou La Batre butterfish industry will continue to fish

with large shrimp trawlers.

- o The cost to catch Gulf butterfish with large shrimp trawlers under the future without project condition will consist of the total variable and fixed vessel operating costs plus vessel damages and diver costs consistent with those of conventional shrimp vessels operating out of Bayou La Batre. Due to the 3-day turnaround and the set annual amounts of butterfish landings used in the analysis, vessel delay costs and opportunity costs to labor are not included in the costs to catch butterfish under the future without project condition.

It is expected that as the demand for butterfish increases, Bayou La Batre will lead all other gulf ports in the amount landed. This is due to several important reasons, each of which is discussed below.

- o Entrepreneurship. Deep Sea Foods, Inc. in Bayou La Batre is presently leading all other gulf commercial fishing interests in conducting fishing trials, processing and in test marketing Gulf butterfish in Japan. This company is also actively involved in attempting to identify and develop new markets in addition to the traditional Japanese market. Such efforts would be expected to give Bayou La Batre a distinct advantage in the future butterfish industry.
- o Location. The location which has yielded the largest and most consistent catches of marketable butterfish during the fishing trials is strategic to Bayou La Batre, directly south and along the continental shelf in waters greater than 150 m deep. See Figure 1. Additionally, the continental shelf off the Alabama coastline averages 60 statute miles in width, one of the narrowest within the Gulf of Mexico. For example, other major Gulf of Mexico commercial fishing ports and their distances from the continental shelf are: Cameron, Louisiana, 140 miles; Intercoastal City, Louisiana, 140 miles; Port Arthur, Texas, 145 miles; Aransas Pass-Rockport, Texas, 80 miles; Brownsville-Port Isabelle, Texas, 70 miles. Although the distance to the continental shelf from the ports of Aransas Pass-Rockport and Brownsville-Port Isabelle, Texas compare favorably with Bayou La Batre, no significant catches of Gulf butterfish have been made in that part of the Gulf of Mexico. In addition, the bottoms at the optimum trawling depth for butterfish in the western Gulf of Mexico are not desirable for trawling due to roughness from rock and coral.

- o Processing and Cold Storage Capacity. Bayou La Batre contains the largest concentration of seafood processing infrastructure of any seafood port within the Gulf of Mexico⁸. The 57 seafood processing establishments at Bayou La Batre currently operate at approximately 55% of annual capacity⁹. This does not mean that the seafood processing interests at Bayou La Batre have grossly overbuilt processing and cold storage capacity. With additional workers and work shifts, the community has the capability, with the existing infrastructure, to process and store the 15 million pounds of butterfish projected to be landed at Bayou La Batre in future years.

2. Future Without Project Condition Costs to Catch Butterfish. As previously discussed, butterfishing out of Bayou La Batre will be conducted with the use of large shrimp trawlers of approximately 90 to 100-foot lengths and 12-foot drafts under the future without project condition. The depth restriction of the 12-foot channel would prevent economical utilization of the larger, 16-foot draft New England type vessels predicted to be used in the Gulf of Mexico as the fishery develops.

The large shrimp trawlers can be operated more economically than a large freezer/trawler type vessel on the 12-foot channel plus these vessels can also be converted and utilized for shrimping when not needed for butterfishing. This is an important consideration, especially during those years when butterfish landings at Bayou La Batre would be at levels requiring less than full utilization of some large shrimp trawlers for butterfishing. It should be noted that the large shrimp trawlers to be fully utilized for butterfishing will be new vessels added to the Bayou La Batre fleet and dedicated to butterfishing. Some existing shrimp trawlers, converted to butterfishing use, would be utilized as needed on a part-time basis to supplement the butterfish fleet in maximizing the catch. The converted shrimp trawlers can be outfitted and returned to shrimping within about three days time; therefore, the fleet has a great amount of flexibility in bringing the required number of trawlers on line to accomplish the butterfish catch.

⁸Unpublished data from Mr. Ted Flowers, National Marine Fisheries Service field representative, Bayou La Batre, September, 1987.

⁹Unpublished data from Mr. Brian Perkins, Seafood Technologist, Alabama Sea Grant Advisory Service, Mobile, Alabama, July, 1987.

The butterfish landings at Bayou La Batre are projected to increase each year from 500,000 pounds during the first year of the project, 1991, to 15 million pounds during the 16th year of the project, 2006, and stay at that level for the remaining project life. It is not inconceivable that future butterfish landings at Bayou La Batre could significantly exceed the projected 15 million pounds, especially if the 64 million pounds of landed Gulf butterfish materialize. Considering Bayou La Batre's strategic location to the most productive butterfishing area within the Gulf of Mexico and its lead in fishing technology and market research, more than a 23% market share of Gulf butterfish landings could result. The 15 million pounds, therefore, represent a conservative estimate of butterfish landings potential for Bayou La Batre but is a quantity that the community has an existing capability to process.

Table III contains the costs by year to catch butterfish out of Bayou La Batre with large shrimp trawlers under the future without project condition.

TABLE III
FUTURE WITHOUT PROJECT CONDITION
YEARLY COSTS TO CATCH BUTTERFISH
UTILIZING LARGE SHRIMP TRAWLERS
BAYOU LA BATRE, ALABAMA

Year	Quantity Landed Lbs.	Vessel Trips	Vessel Operating Costs (\$1000)	Vessel Damages (\$1000)	Diver Costs (\$1000)
1991	500,000	17	\$ 156.0	\$ 1.6	\$ 0.2
1992	1,500,000	50	458.8	4.7	0.7
1993	2,500,000	83	761.6	7.8	1.1
1994	3,500,000	117	1,073.6	11.0	1.5
1995	4,500,000	150	1,376.4	14.1	2.0
1996	5,500,000	183	1,679.2	17.2	2.4
1997	6,500,000	217	1,991.2	20.4	2.8
1998	7,500,000	250	2,294.0	23.5	3.3
1999	8,500,000	283	2,596.8	26.6	3.7
2000	9,500,000	317	2,908.8	29.8	4.1
2001	10,500,000	350	3,211.6	32.9	4.6
2002	11,400,000	380	3,486.9	35.7	4.9
2003	12,500,000	417	3,826.4	39.2	5.4
2004	13,500,000	450	4,129.2	42.3	5.9
2005	14,400,000	480	4,404.5	45.1	6.2
2006 thru 2040	15,000,000	500	4,588.0	47.0	6.5

Table IV contains the average annual equivalent costs for butterfishing under the future without project condition.

TABLE IV
AVERAGE ANNUAL EQUIVALENT COSTS
BUTTERFISHING, FUTURE WITHOUT PROJECT CONDITION

Item	Average Annual Cost
Vessel Operating Costs	\$2,597,200
Vessel Damages	26,600
Diver Costs	3,700
Total Average Annual Costs	\$2,627,500

D. FUTURE WITH PROJECT CONDITION.

1. General. The operational patterns, type vessels used and, consequently, the cost of butterfishing out of Bayou La Batre will vary, depending upon future amounts of butterfish landed and the depth of the channel provided under the with project condition. The following paragraphs describe what is considered to be the most likely butterfishing scenario for each channel depth investigated for the project. These scenarios are the result of a cost analysis, which incorporated various types and sizes of fishing vessels, operational patterns, and quantities of landings, performed by the Mobile District to identify the most economical method of vessel operation, and through coordination with commercial fishing interests at the project.

It is expected - and the costs analysis supports - that as butterfish landings increase in the Gulf of Mexico, the use of large vessels resembling New England type freezer-processors will enter the gulf commercial fleet. The New England freezer-processors used in the Gulf of Mexico for butterfishing measure 140' length x 32' beam x 16' draft. Commercial fishing interests at Bayou La Batre agree that vessels of this size would likely be utilized in the future provided the quantity of butterfish landings and adequate channel depth exist. It is expected that these large vessels would be utilized light-loaded with a 16-foot channel and fully loaded with an 18-foot and greater depth channel. Tables V and VI contain the fixed and variable vessel operating costs for the large New England type vessels light-loaded and fully loaded, respectively.

TABLE V
ANNUAL COSTS
BUTTERFISHING WITH NEW ENGLAND TYPE VESSEL
LIGHT-LOADED TO DRAFT 14 FEET

CATCH/VESSEL/YEAR

Catch/ Trip lbs.	Number Trips/ Year*	Days Fished/ Year 4 d/trip**
132,000	43	172

* Based on 7 days/trip w/ 3-day turnaround. 304-day season.

** Based on time at sea.

VARIABLE COSTS/VESSEL/YEAR

Fuel Expense ¹	Repairs & Maint. ²	Other Expense ³	Crew Share ⁴	Captain's Share ⁵	Total Variable Costs
\$232,200	\$153,080	\$68,800	\$135,000	\$46,000	\$635,080

FIXED COSTS/VESSEL/YEAR⁶

Total Fixed Costs	Percent of Total Cost	Variable Cost/Trip
\$290,000	31%	\$14,769

TOTAL COSTS : \$925,080

ROUNDED : \$925,000

¹ Based upon \$1,350 per day of fishing. Centaur Data, Exhibit 2-58, pg 2-123, (\$135,000/100 days fished = \$1,350/day).

² Based upon \$890 per day of fishing. Centaur Data, Exhibit 2-58, pg 2-123, Misc. repairs(\$40,000) + engine maint. (\$35,000) + gear maint. (\$14,000) = \$89,000 / 100 days fished = \$890/day.

³ Based upon \$400 per day of fishing. Centaur Data, Exhibit 2-58, pg 2-123, Other variable costs and supplies (\$40,000 / 100 days = \$400/day.

⁴ Based upon 25.2% of revenues. Table 6. (\$86,184 / \$341,550) or a maximum of \$135,000 for 5 crew members (Deep Sea Foods, Inc.).

⁵ Based upon 11.4% of revenues. Table 6. (\$38,880 / \$341,550) or a maximum of \$46,000 (Deep Sea Foods, Inc.).

⁶ Fixed costs = 30% of total costs. Based upon U.S. International Trade Comm. Report, Conditions of Competition Affecting the U.S. Gulf and Atlantic Shrimp Industry., 1985.

TABLE VI
ANNUAL COSTS
BUTTERFISHING WITH NEW ENGLAND TYPE VESSEL
FULLY LOADED, DRAFTING 16 FEET

CATCH/VESSEL/YEAR

Catch/ Trip lbs.	Number Trips/ Year*	Days Fished/ Year 5 d/trip**
300,000	38	190

* Based on 8 days/trip w/ 3-day turnaround. 304-day season.

** Based on time at sea.

VARIABLE COSTS/VESSEL/YEAR

Fuel Expense ¹	Repairs & Maint. ²	Other Expense ³	Crew Share ⁴	Captain's Share ⁵	Total Variable Costs
\$256,500	\$169,100	\$76,000	\$150,000	\$60,000	\$711,600

FIXED COSTS/VESSEL/YEAR⁶

Total Fixed Costs	Percent of Total Cost	Variable Cost/Trip
\$290,000	29%	\$18,726

TOTAL COSTS : \$1,001,600

ROUNDED : \$1,002,000

- ¹ Based upon \$1,350 per day of fishing. Centaur Data, Exhibit 2-58, pg 2-123, (\$135,000/100 days fished = \$1,350/day).
- ² Based upon \$890 per day of fishing. Centaur Data, Exhibit 2-58, pg. 2-123, Misc. repairs(\$40,000) + engine maint. (\$35,000) + gear maint. (\$14,000) = \$89,000 / 100 days fished = \$890/day.
- ³ Based upon \$400 per day of fishing. Centaur Data, Exhibit 2-58, pg 2-123, Other variable costs and supplies (\$40,000 / 100 days = \$400/day).
- ⁴ Based upon 25.2% of revenues. Table 6. (\$86,184 / \$341,550) or a maximum of \$150,000 for 5 crew members (Deep Sea Foods, Inc.).
- ⁵ Based upon 11.4% of revenues. Table 6. (\$38,880 / \$341,550) or a maximum of \$60,000 (Deep Sea Foods, Inc.).
- ⁶ Fixed costs = 30% of total costs. Based upon U.S. International Trade Comm. Report, Conditions of Competition Affecting the U.S. Gulf and Atlantic Shrimp Industry., 1985.

The New England type vessels to be utilized by the Bayou La Batre butterfishing interests would be outfitted with holding tanks containing ice slurry or refrigerated sea water to preserve the catch. The fully loaded capacity, 300,000 pounds, of these vessels would be the same as the New England freezer-processors. The vessels would bring the catch into Bayou La Batre and utilize the existing labor force and infrastructure for processing and freezing. The relatively narrow continental shelf and the close proximity of the fishing grounds to Bayou La Batre will permit this more economical method of vessel operation while maintaining the quality of the fish required for successful marketing.

The vessel operating costs used to compute the costs to catch butterfish under each scenario were applied as follows. For the large shrimp trawlers, an average total cost - variable and fixed costs - per trip was used. Since some shrimp trawlers used for butterfishing would operate on a part-time basis and shrimp the remainder of the year, only that portion of the variable and fixed costs of the vessel while actually engaged in butterfishing was allocated toward this activity. For the New England type vessels, all of the fixed costs of each vessel was applied to butterfishing since these would be dedicated butterfish vessels and would not be used for any other activity. An average variable cost per trip was computed for these vessels and applied toward butterfishing to account for the fact that, in some years, these vessels would not operate to their full capability due to the limit of butterfish landings projected for that year.

2. 14-Foot Channel. The use of large shrimp trawlers for butterfishing will continue with a 14-foot channel. This channel depth will not permit the large New England type vessels to be utilized economically due to the degree of light-loading required to operate with the desired two feet of underkeel clearance. The \$2,597,200 average annual equivalent vessel operating costs would remain; however, increased efficiencies in butterfishing would accrue to the 14-foot channel through the elimination of vessel damages and diver costs. The average annual equivalent costs eliminated by this channel depth total \$30,300.

3. 16-Foot Channel. A 16-foot channel would allow the use of the large New England type vessels; however, these vessels would operate out of Bayou La Batre light-loaded to draft 14 feet in order to provide the desired two feet of underkeel clearance. Light-loading to a 14-foot draft will limit the capacity of the vessel to 132,000 pounds of fish per trip. The cost analysis performed by the Mobile District yielded the following scenario for the 16-foot channel under the future with project condition.

A large shrimp trawler will be used to land the first year's

quantity of 500,000 pounds of butterfish at a cost of \$156,000. Beginning the second year of the project, one large New England type vessel will come on line and make 11 trips to land the projected 1.5 million pounds of butterfish at Bayou La Batre at a cost of \$452,500. This vessel will be operated light-loaded with increasing numbers of trips per year to land the projected catches of butterfish. During the seventh year, this vessel will be supplemented with one large shrimp trawler making 27 trips to land the projected 6.5 million pounds of butterfish for that year. During the eighth year, a second New England type vessel will enter the fleet. These two light-loaded New England type vessels will operate exclusively to land butterfish at Bayou La Batre until the 12th and 13th years of the project when they will be assisted with converted shrimp trawlers making five and 38 trips, respectively, for those years. During the 14th year of the project, a third New England type vessel will enter the fleet. Three of these vessels will operate light-loaded on the 16-foot deep channel with increasing numbers of trips, making a combined total of 114 trips during the 16th year and remaining years, to land 15 million pounds of butterfish at an annual operating cost of \$2.6 million. Table VII contains a summary of the with project 16-foot channel butterfishing scenario.

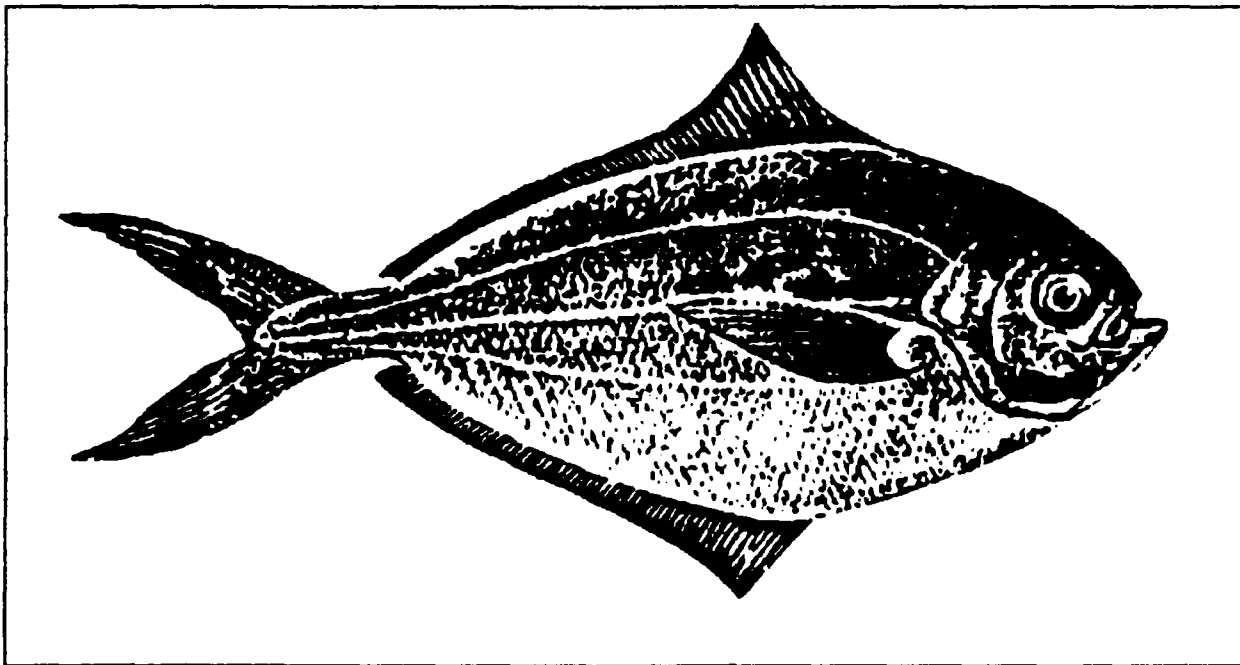
TABLE VII
BUTTERFISH LANDINGS AND COSTS
BAYOU LA BATRE, ALABAMA
16-FOOT DEEP CHANNEL

Butterfish Landings (lbs.)	No. Large Vessels	No. Large Vessel Trips	Large Vessel Costs (\$1000)	No. Shrimp Vessel Trips	Shrimp Vessel Costs (\$1000)	Total Costs (\$1000)
500,000	0	0	\$ 0.0	17	\$ 156.0	\$ 156.0
1,500,000	1	11	452.5	0	0.0	452.5
2,500,000	1	19	570.6	0	0.0	570.6
3,500,000	1	27	688.8	0	0.0	688.8
4,500,000	1	34	792.2	0	0.0	792.2
5,500,000	1	42	910.3	0	0.0	910.3
6,500,000	1	43	925.1	27	247.8	1,172.9
7,500,000	2	57	1,421.8	0	0.0	1,421.8
8,450,000	2	64	1,525.2	0	0.0	1,525.2
9,500,000	2	72	1,643.4	0	0.0	1,643.4
10,500,000	2	80	1,761.5	0	0.0	1,761.5
11,500,000	2	86	1,850.1	5	45.9	1,896.0
12,500,000	2	86	1,850.1	38	348.7	2,198.8
13,450,000	3	102	2,376.4	0	0.0	2,376.4
14,500,000	3	110	2,494.6	0	0.0	2,494.6
15,000,000	3	114	2,553.7	0	0.0	2,553.7

The average annual equivalent costs for butterfishing under the with project 16-foot channel is \$1,498,000.

4. 18-Foot Channel. An 18-foot channel will allow the New England type vessel to operate fully loaded with 300,000 pounds of fish per trip into Bayou La Batre. The following scenario is expected in conjunction with this channel.

During the first year of the project, a large shrimp trawler will land 500,000 pounds of butterfish at Bayou La Batre at a cost of \$156,000. Beginning the second year of the project, one fully loaded New England type vessel will make 5 trips to land the projected 1.5 million pounds of butterfish at a cost of \$383,600. This vessel will be operated fully loaded with increasing numbers of trips per year to land the projected catches of butterfish. During the 13th year of the project, this vessel will make its full complement of 38 trips and will be supplemented with a converted shrimp trawler making 37 trips to land the projected 12.5 million pounds of butterfish at a cost of \$1.3 million. During the 14th year, a second New England type vessel will come on line. Two of these vessels will operate out of Bayou La Batre, increasing the total number of trips as necessary to land the projected amounts of butterfish. During the 16th and subsequent years of the project, both of the New England type vessels will make a combined total of 50 trips to land 15 million pounds of butterfish at an annual cost of \$1.5 million. Table VIII contains a summary of the with project 18-foot channel butterfishing scenario.



Gulf Butterfish, *Peprilus burti*.

TABLE VIII
BUTTERFISH LANDINGS AND COSTS
BAYOU LA BATRE, ALABAMA
18-FOOT DEEP CHANNEL

Butterfish Landings (lbs.)	No. Large Vessels	No. Large Vessel Trips	Large Vessel Costs (\$1000)	No. Shrimp Vessel Trips	Shrimp Vessel Costs (\$1000)	Total Costs (\$1000)
500,000	0	0	\$ 0.0	17	\$ 156.0	\$ 156.0
1,500,000	1	5	383.6	0	0.0	383.6
2,500,000	1	8	439.8	0	0.0	439.8
3,500,000	1	12	514.7	0	0.0	514.7
4,500,000	1	15	570.9	0	0.0	570.9
5,500,000	1	18	627.1	0	0.0	627.1
6,500,000	1	22	702.0	0	0.0	702.0
7,500,000	1	25	758.2	0	0.0	758.2
8,500,000	1	28	814.3	0	0.0	814.3
9,500,000	1	32	889.2	0	0.0	889.2
10,500,000	1	35	945.4	0	0.0	945.4
11,400,000	1	38	1,001.6	0	0.0	1,001.6
12,500,000	1	38	1,001.6	37	339.5	1,341.1
13,500,000	2	45	1,422.7	0	0.0	1,422.7
14,400,000	2	48	1,478.8	0	0.0	1,478.8
15,000,000	2	50	1,516.3	0	0.0	1,516.3

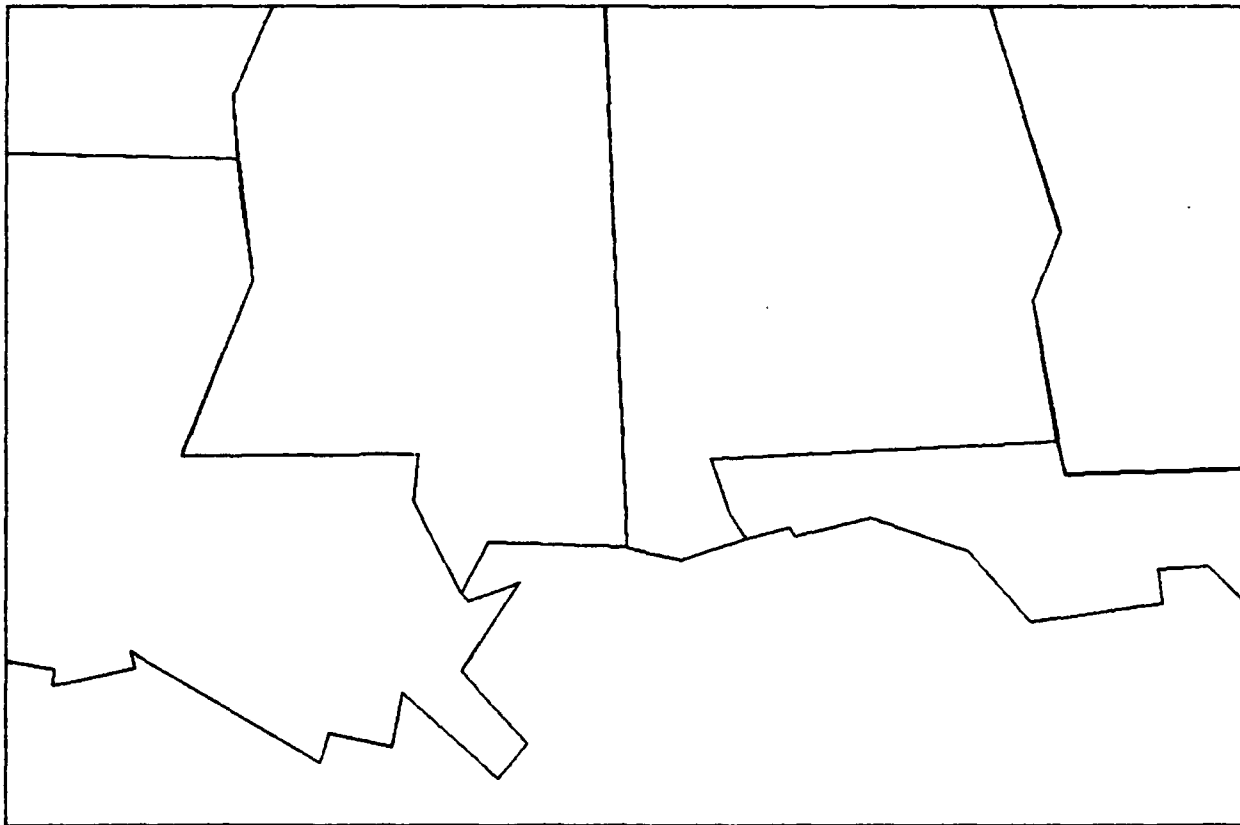
The average annual equivalent costs for butterfishing under the with project 18-foot channel is \$910,300.

5. 20-Foot and 22-Foot Channels. The with project condition vessel operations and costs for butterfishing are the same for the 20-foot and 22-foot channels as described for the 18-foot channel.

6. Summary of Average Annual Costs and Benefits for Butterfish. Table VIII contains the average annual costs, average annual benefits and incremental benefits by channel depth for butterfishing out of Bayou La Batre.

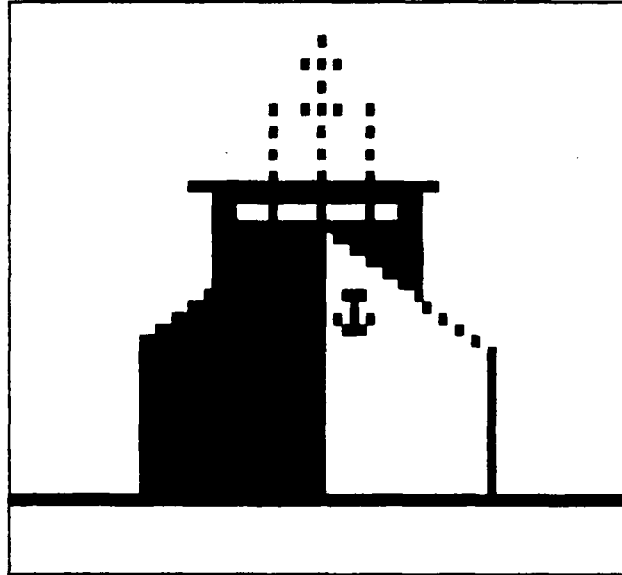
TABLE VIII
BUTTERFISH
AVERAGE ANNUAL COSTS AND BENEFITS
BAYOU LA BATRE, ALABAMA

Condition	Average Annual Costs	Average Annual Benefits	Incremental Benefits
Without Project	\$2,627,500	n/a	n/a
14-foot Channel	2,597,200	30,300	30,300
16-foot Channel	1,498,000	1,129,500	1,099,200
18-foot Channel	910,300	1,717,200	587,700
20-foot Channel	910,300	1,717,200	0
22-foot Channel	910,300	1,717,200	0



III. SHIPBUILDING, SPLIT OPERATIONS.

A. GENERAL. The process of conducting split operations in shipbuilding is occasionally used by Bayou La Batre shipbuilders to construct or repair large, deep draft vessels. Deep draft vessels in this case refer to vessels that draft 16 feet or greater fully loaded. Under a split operation, the shipbuilder constructs the hull and outfits the vessel at Bayou La Batre to the fullest extent possible, then, due to the limitations of the existing 12-foot deep channel, utilizes a leased or rented yard with access to deeper water to complete construction, to outfit and to sea trial the vessel. Although several Bayou La Batre shipbuilders have successfully bid on vessel construction and repair jobs where split operations were conducted, this process involves significant cost inefficiencies in performing the work. Extra crew travel, lodging, logistics of moving heavy equipment to and from the rented yard, and some reworking of the vessel result in additional costs for vessel construction or repair.



Several Bayou La Batre shipbuilders have and continue to be asked to bid on jobs that would require that a split operation be conducted; however, alternate yards with access to deeper water are not always available. There have been occasions when Bayou La Batre shipbuilders have successfully bid on construction or repair jobs for larger vessels to be conducted under a split operation only to lose the availability of an alternate yard, resulting in forfeiture of the contract. In most instances, the Bayou La Batre shipbuilders can perform the work at a cheaper price - normally 15% to 30% less - than the contractors which obtain these jobs, due to non-unionized labor, workers that can cross skill lines, and other efficiencies within their operation. This has been demonstrated in the past from bids for construction and repair work submitted by Bayou La Batre shipbuilders.

Interviews with several major shipbuilders at Bayou La Batre have resulted in information concerning split operations being performed or attempts made to win construction and repair contracts on deeper draft vessels. Several major shipbuilders have provided future production schedules which show continuing

effort to win contracts for vessel construction or repair necessitating the use of split operations. The consensus among these shipbuilders is that an increase in the number of larger vessels to be constructed and/or repaired will be required in the future in order for them to remain in the shipbuilding and repair business. The smaller vessels do not offer the unit volume of business required for them to remain profitable.

Many opportunities exist for Bayou La Batre shipbuilders to construct or repair larger vessels if a deeper channel were provided. The commercial fishing vessels utilized by the South American, Central American and Mexican fleets are rapidly growing in size and draft. Many of these vessels are large vessels used for tuna and other deep water fishing and draft up to 30 feet fully loaded. Other large vessel construction or repair work currently being performed by either foreign or domestic shipbuilders at greater costs than could be obtained at Bayou La Batre are oil supply and crew vessels as well as U.S. military and U.S. Coast Guard vessels.

B. EXISTING CONDITION. Three Bayou La Batre shipbuilders have furnished confidential financial data which provides the costs of conducting split operations for construction, servicing and repair of large vessels. In these cases, the vessel construction or repair was split between their yards in Bayou La Batre and leased yards in Pascagoula, Mississippi or Mobile, Alabama. The total cost of split operations for these three shipbuilders was \$493,300. This total cost includes the costs to construct or repair large military or research type vessels and to annually service and repair large vessels used by the oil industry. These costs are listed and described for each shipbuilder in the confidential financial review package and are summarized in Table 3 of that package.

Other Bayou La Batre shipbuilders have conducted split operations in the repair or conversion of vessels; however, the costs of these split operations could not be separated out of the total repair or conversion costs contained in their records for these jobs. It was estimated by these shipbuilders that approximately 15% of the total vessel repair costs was the result of conducting a split operation and could have been saved had the vessels been repaired or outfitted completely in Bayou La Batre.

C. FUTURE WITHOUT PROJECT CONDITION. It is assured that Bayou La Batre shipbuilders will continue to compete for and win shipbuilding and repair contracts requiring split operations. The level of activity of certain split operations is expected to increase at the same rate, 1.4% annually, as that projected for general shipbuilding and repair. See Appendix B, Bayou La Batre Feasibility Report, page B-51. Some activities requiring split operations are conducted on an annual basis, such as the service

and repair of oil industry vessels. Due to the substantial increase in oil and natural gas exploration and production activity in Mobile Bay and the adjacent Gulf of Mexico, it is expected that split operations conducted for the servicing and repair of these vessels will increase significantly. For the purpose of this analysis, the 1.4% annual increase in the cost of these split operations is used. This is considered to be very conservative, considering the future increases in oil and gas exploration and production anticipated to occur in the vicinity. The annual costs of these split operations range - due to the 1.4% annual growth - from \$284,500 in the first year of the project to \$562,100 in the 50th year. The average annual equivalent cost is \$334,100.

Other split operations costs incurred under the existing conditions were for the construction and repair of large military and research type vessels. Although it is not envisioned that these type vessels would be constructed or repaired on an annual basis by Bayou La Batre shipbuilders under the future without project condition, it is likely, based on past performance, that such vessel construction will occur periodically in the future. For the purpose of this analysis, it is assumed that, on the average, one large military and one very large research type vessel would be constructed or repaired every five years over the life of the project. These vessels would be similar in size and draft to vessels of this type which have been constructed or repaired at Bayou La Batre in previous years. The costs of these split operations would be \$292,900 every five years resulting in an average annual equivalent cost of \$72,900.

The total average annual equivalent costs for split operations at Bayou La Batre under the future without project condition is \$407,000.

D. FUTURE WITH PROJECT CONDITION.

1. Service and Repair of Oil Industry Vessels. A deepened channel at Bayou la Batre will reduce the costs of maintenance, repair and servicing of oil industry vessels. This activity, described under the future without project condition, is expected to increase at an average 1.4% per year over the life of the project. The total average annual equivalent cost projected for these repairs and services is \$334,100. An 18-foot channel will eliminate \$222,600 of the average annual cost while a 20-foot channel will eliminate \$15,200 of the total. An average annual equivalent operating cost of \$96,300 will remain for these operations and include costs for repair crew food, vessel transportation, and other expenses.

2. Construction and Repair of Large Vessels. As indicated through interviews conducted with Bayou La Batre

shipbuilders, the number of large vessels constructed or repaired at Bayou La Batre will increase significantly with a deeper channel. This is due to the following reasons:

- o The trend, especially with South and Central American commercial fishing fleets, is toward larger and deeper draft vessels which would provide greater opportunities for Bayou La Batre shipbuilders to construct and repair these vessels.
- o Increasing oil and natural gas exploration and production within Mobile Bay and the Gulf of Mexico will significantly increase the presence of large seismographic and supply vessels requiring service and repair.
- o The Bayou La Batre shipbuilders will pursue the construction and repair of larger vessels more aggressively due to the availability of deeper water and the elimination of the need to conduct split operations.

Data provided by certain shipbuilders at Bayou La Batre concerning forfeited or foregone opportunities for repair contracts for deep draft vessels and are used to project the quantity of such activity under the future with project condition. In one instance, a contract for the repair of 10 foreign deep-draft commercial fishing vessels was forfeited due to the loss of the utilization of an alternate yard with access to deeper water. These vessels had a loaded draft of 30 feet and, due to the loss of stability¹⁰, could draft no shallower than 16 feet. This \$10.4¹¹ million contract was lost to a foreign repair yard at a price 15% higher than the Bayou La Batre bid. Although it is not expected that each major shipbuilder would experience this type and volume of work on an annual basis, this contract is used as a surrogate for the total quantity of construction or repair of these size vessels that could be expected annually for all major shipbuilders at Bayou La Batre. It is this difference in bid price, \$1.56 million, that is used as a basis to compute increasing annual repair and construction activity for vessels requiring an 18-foot channel.

The rate of increase for the construction and repair of these type vessels under the future with project condition is

¹⁰Due to the location of the center of buoyancy of the vessel, a draft less than 16 feet causes the vessel to list severely, resulting in complete loss of maneuverability.

¹¹This contract was bid in a previous year. The original price has been indexed to 1988.

1.4% annually over the 50-year life of the project, consistent with the expected increase in existing shipbuilding activity. The value of this additional shipbuilding activity ranges from \$1.56 million during the first year of the project to \$3.1 million during the 50th year.

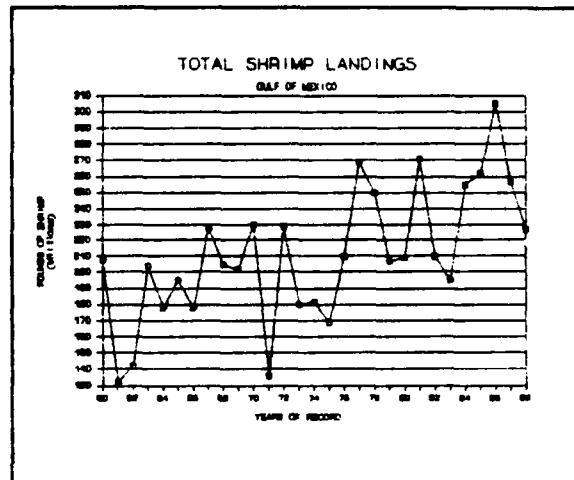
E. Average Annual Costs and Benefits. At least an 18-foot deep channel will be required, due to the 16-foot vessels' draft, to eliminate a portion of the costs of split operations projected for the future without project condition. Furthermore, an 18-foot channel will be required to provide adequate depth for the additional deep draft vessels projected for construction or repair under the future with project condition. A 20-foot deep channel would be required to allow the oil tankers, which draft 18 feet loaded, to be repaired within Bayou La Batre. Table IX lists the average annual costs of split operations and resulting benefits to the 18-foot and 20-foot deep channels at Bayou La Batre.

TABLE IX
SHIPBUILDING, SPLIT OPERATIONS
AVERAGE ANNUAL COSTS AND BENEFITS
18-FOOT AND 20-FOOT DEEP CHANNELS
BAYOU LA BATRE, ALABAMA

Condition	Average Annual Costs	Average Annual Incremental Benefits
<u>Oil Vessel Service and Repair.</u>		
Future Without Project	\$ 407,000	n/a
18-foot Channel	111,500	295,500
20-foot Channel	96,300	15,200
<u>Large Vessel Construction and Repair, Additional With Project.</u>		
18-foot Channel	0	1,831,900
Total Average Annual Benefits (18-foot channel)		\$2,127,400
Total Average Annual Benefits (20-foot channel)		15,200

IV. COMMERCIAL FISHING, SHRIMP.

A. GENERAL. Records of shrimp landings within the Gulf of Mexico over the last 30 years show significant annual variation. The annual variation is due to differing combinations of factors such as fuel prices, environmental conditions, market prices for shrimp versus other commercial species, etc. The trend, however, is that shrimp landings from the Gulf of Mexico have generally been increasing at an average rate of about two percent per year over the period 1960 through 1988. The Gulf of Mexico Fishery Management Council (GOMFMC) has projected an available 301.7 million pounds of shrimp for harvest by the gulf commercial fleet¹². This Maximum Probable Catch (MPC) is based upon assumptions of environmental conditions and level of effort by the commercial shrimping fleet.



Gulf Shrimp Landings, 1960-1988

Some estimates project Gulf of Mexico shrimp landings increasing to the level of Maximum Probable Catch in the future and then leveling off at that amount. Other theories have been advanced which conclude that the average quantity of shrimp harvested from the Gulf of Mexico has stabilized since all trawlable bottom is currently being exploited to the fullest extent practicable. Others believe that the shrimp harvest from the Gulf of Mexico will begin an immediate decline due to the effects of diminishing marsh along the Louisiana coastline. Still others predict that, due to the erosion of marsh and the release of stored food source - detritus - into the waters of the gulf, a short term increase in shrimp landings will occur, followed by a decline over the coming years.

The National Marine Fisheries Service predicts that average shrimp landings from the Gulf of Mexico will remain relatively stable over the coming years, at a level equal to that experienced over the past five years. It is this scenario that is used to compute the revised future without project and with

¹²Fishing Management Plan for the Shrimp Industry of the Gulf of Mexico, United States Waters, Gulf of Mexico Fishery Management Council, November 1981, pp. 4-36 through 5-9.

project costs to the Bayou La Batre commercial shrimping fleet.

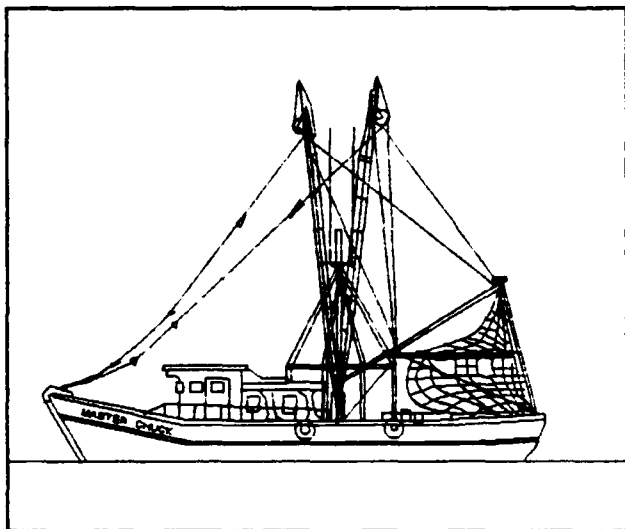
B. EXISTING CONDITION. The costs experienced annually by the commercial fishing fleet at Bayou La Batre is described in Appendix B of the Feasibility Report, pages B-14 through B-30. These costs were computed from the distribution of loaded vessel drafts - shown in Table 8B, page B-22, of Appendix B - serving Bayou La Batre. The costs of fleet operations are summarized in Table 14, page B-30 of Appendix B and in Table X, below.

TABLE X
EXISTING COSTS, COMMERCIAL FISHING FLEET
BAYOU LA BATRE, ALABAMA

Categories	Existing Costs
Vessel Delays	\$119,200
Opportunity Costs, Labor	175,400
Vessel Damages	420,300
Diver Expenses	46,200
Additional Travel Time Via Petit Bois Pass	76,900
TOTAL EXISTING COSTS	\$838,000

C. FUTURE WITHOUT PROJECT CONDITION. The shrimp landings at Bayou La Batre, as a percentage of total gulf landings, have remained remarkably consistent at a 6% market share¹³. It is expected that this trend will continue into future years; therefore, the yearly costs incurred by the Bayou La Batre commercial fishing fleet are held constant over the 50-year period of analysis. Under the future without project condition, Bayou La Batre commercial fishermen will continue to experience additional costs for vessel delays, damages, opportunity costs, etc., due to the restrictions of the existing 12-foot channel. The costs per year to operate commercial fishing vessels under

¹³Computed from data of total Gulf of Mexico and Bayou La Batre shrimp landings, provided by the National Marine Fisheries Service, Bayou La Batre, Alabama.



this condition total \$838,000. As previously discussed, the scenario used in this analysis for projected shrimp landings from the Gulf of Mexico is that of a stable yield, approximating an average of annual landings over the past five years, 1984-1988.

The average annual cost inefficiencies projected for the Bayou La Batre commercial shrimping fleet under the future without project condition total \$838,000.

D. FUTURE WITH PROJECT CONDITION. The amount of Bayou La Batre commercial shrimping fleet operational cost inefficiencies eliminated under the future with project condition varies with proposed channel depth, based upon the distribution of vessels' draft. The elimination of cost inefficiencies, and resulting average annual benefits, by channel depth are shown in Table XI.

TABLE XI
COMMERCIAL SHRIMPING FLEET
AVERAGE ANNUAL COST INEFFICIENCIES AND BENEFITS
BAYOU LA BATRE, ALABAMA

Condition	Average Annual Cost Inefficiencies	Average Annual Benefits	Incremental Benefits
Without Project	\$838,000	n/a	n/a
14-foot Channel	136,600	701,400	701,400
16-foot Channel	8,700	829,300	127,900
18-foot Channel	0	838,000	8,700
20-foot Channel	0	838,000	0
22-foot Channel	0	838,000	0

V. SUMMARY OF WITH PROJECT CONDITION COSTS AND BENEFITS.

A. GENERAL. The following generally describes the average annual equivalent costs remaining and the benefits of the various proposed channel depths and extensions evaluated under the Bayou La Batre Feasibility Study. The average annual costs and benefits contained herein are composed of those originally developed and shown in Appendix B, Economic Analysis, of the final Feasibility Report and those revised as a result of this analysis. Table XII contains the average annual equivalent costs remaining for each activity, channel depth, and for each channel extension into Snake Bayou and above the Highway 188 bridge. Table XIII lists the average annual total and incremental benefits by activity, channel depth and channel extension.

B. 14-FOOT CHANNEL. The 14-foot channel, including the extension above the Highway 188 bridge and into snake Bayou, will principally eliminate vessel damages and delays, diver costs, and opportunity costs currently experienced by the commercial shrimping fleet and those projected for the commercial butterfishing fleet. Some benefit to the shipbuilding industry would accrue to this channel depth due to elimination of vessel damages and delays for the 12-foot trawlers constructed or repaired.

C. 16-FOOT CHANNEL. The 16-foot channel would eliminate vessel damages and delays experienced by the 14-foot draft shrimp trawlers currently utilizing the existing Bayou La Batre channel. The shipbuilding industry would benefit due to the elimination of vessel damages, delays and small split operations conducted at the project. Significant benefits would accrue to the projected future butterfish industry at this channel depth by allowing the use of large light-loaded New England type vessels.

D. 18-FOOT CHANNEL. The 18-foot channel would eliminate most remaining costs for the commercial shrimping and shipbuilding industries at Bayou La Batre. The benefits to the future projected butterfish industry would be maximized at this channel depth.

E. 20-FOOT AND 22-FOOT CHANNELS. The 20-foot channel would eliminate the costs to repair small tankers and large research vessels, drafting 18', at Petit Bois Island experienced by one of the Bayou La Batre shipbuilders. Since there are no remaining cost inefficiencies remaining for the 20-foot channel, the 22-foot channel benefits are the same as that for the 20-foot channel.

TABLE XII
AVERAGE ANNUAL EQUIVALENT COSTS, REMAINING
BY CHANNEL DEPTH
BAYOU LA BATRE, ALABAMA
(\$1000)

Activity	Without Project Costs	Remaining Costs By Channel Depth				
		14'	16'	18'	20'	22'
<u>Commercial Fishing.</u>						
Shrimping	\$ 838.0	\$ 136.6	\$ 8.7	\$ 0.0	\$ 0.0	\$ 0.0
Butterfishing	2,627.5	2,597.2	1,498.0	910.3*	910.3*	910.3*
<u>Shipbuilding, Main Channel.</u>						
Split Operations	407.0	407.0	407.0	111.5	96.3*	96.3*
Damages, Delays	544.2	0.0	0.0	0.0	0.0	0.0
<u>Shipbuilding.</u>						
Snake Bayou	310.2	0.0	0.0	0.0	0.0	0.0
Above Hwy. 188	488.2	0.0	0.0	0.0	0.0	0.0

* These costs are normal operating costs not eliminated by any channel depth.

TABLE XIII
AVERAGE ANNUAL EQUIVALENT INCREMENTAL BENEFITS
BY CHANNEL DEPTH
BAYOU LA BATRE, ALABAMA
(\$1000)

Activity	Without Project Costs	Incremental Benefits By Channel Depth				
		14'	16'	18'	20'	22'
<u>Commercial Fishing.</u>						
Shrimping	\$ 838.0	\$ 701.4	\$ 127.9	\$ 8.7	\$ 0.0	\$ 0.0
Butterfishing	2,627.5	30.3	1,099.2	587.7	0.0	0.0
<u>Shipbuilding, Main Channel.</u>						
Split Operations	407.0	0.0	0.0	295.5	15.2	0.0
Damages, Delays	544.2	544.2	0.0	0.0	0.0	0.0
Large Vessel						
Construction & Repair	0.0	0.0	0.0	1,832.0	0.0	0.0
<u>Shipbuilding.</u>						
Snake Bayou	310.2	310.2	0.0	0.0	0.0	0.0
Above Hwy. 188	488.2	488.2	0.0	0.0	0.0	0.0
INCREMENTAL BENEFITS						
		\$2,074.3	\$1,227.1	\$2,723.9	\$ 15.2	\$ 0.0
TOTAL BENEFITS, BY DEPTH						
		\$2,074.3	\$3,301.4	\$6,025.3	\$6,040.5	\$6,040.5

VI. PLAN FORMULATION.

A. GENERAL. The plan formulation methodology is described starting on page 80 of the final Feasibility Report. The alternative channel depths and alignments evaluated for the project are summarized in Tables XXIII and XXIV on pages 84 and 85, respectively, of the main report.

B. PLAN FORMULATION. Tables XIV and XV that follow contain average annual benefits for the Bayou La Batre project resulting from the revised analyses presented in this appendix, average annual costs, and resulting net benefits. The plan symbols shown in each of the tables are described on page 86 of the Main Feasibility Report. The average annual costs and benefits for the channels into Snake Bayou and above the Highway 188 bridge are also included in these tables, although the economic and environmental feasibility of these segments were evaluated independently.

TABLE XIV
ALTERNATIVE PLANS, ALL CHANNEL DEPTHS
BAYOU LA BATRE, ALABAMA

Channel Depth	Plan Symbol	Average Annual Benefits (\$1000)	Average Annual Costs (\$1000)	Total Net Benefits (\$1000)
14 Feet	BA+SB+GA	\$1,997.4	\$1,660.6	\$ 336.8
16 Feet	BA+SB+GA	3,224.5	2,030.7	1,193.8
18 Feet	BA+SB+GA	5,948.4	2,188.9	3,759.5
20 Feet	BA+SB+GA	5,963.6	2,490.5	3,473.1
22 Feet	BA+SB+GA	5,963.6	2,709.0	3,254.6
14 Feet	BA+SB+PA	\$2,074.3	\$2,274.3	\$ -200.0
16 Feet	BA+SB+PA	3,301.4	2,745.6	555.8
18 Feet	BA+SB+PA	6,025.3	2,875.9	3,149.4
20 Feet	BA+SB+PA	6,040.5	3,231.9	2,808.6
22 Feet	BA+SB+PA	6,040.5	3,446.5	2,594.0

Note: The plans symbol ending with "PA" or "GA" denote alternative channel alignments through Petit Bois Pass, or along the Gulf Intracoastal Waterway (GIWW) alignment to the Pascagoula Ship Channel, respectively. See Figure 17, page 79 of main report. The difference in the average annual benefits for plans with these alignments, \$76,900, is due to the reduced cost of vessel running time that alternative channels through Petit Bois Pass, the "PA" alternatives, would provide commercial fishing vessels operating due south or east of the project.

A comparison of the average annual equivalent costs and benefits associated with each alternative resulted in a clear indication that an 18-foot channel depth provided the greatest net economic benefits for the project. Therefore, further evaluation was performed on a final array of 18 alternative plans, each at the 18-foot channel depth. These 18 alternative plans for the 18-foot deep channel represent combinations of channel segments and varying construction and maintenance dredged material disposal methods. The final array of alternative plans, with the revised average annual benefits, is shown in Table XV.

TABLE XV
ALTERNATIVE PLANS, 18-FOOT CHANNEL
BAYOU LA BATRE, ALABAMA

Alternative Plan	Symbol	Average Annual Benefits (\$1000)	Average Annual Costs (\$1000)	Total Net Benefits (\$1000)
I	BA+SA+PA	\$6,025.3	\$2,932.1	\$3,093.2
II	BA+SB+PA	6,025.3	2,875.9	3,149.4
III	BA+SC+PA	6,025.3	2,953.6	3,071.7
IV	BA+SD+PA	6,025.3	2,900.8	3,124.5
V	BA+SA+PB	6,025.3	3,055.4	2,969.9
VI	BA+SB+PB	6,025.3	2,999.2	3,026.1
VII	BA+SC+PB	6,025.3	3,076.9	2,948.4
VIII	BA+SD+PB	6,025.3	3,024.1	3,001.2
IX	BA+SE+PB	6,025.3	3,257.4	2,767.9
X	BA+SA+GA	\$5,948.4	\$2,245.1	\$3,703.3
XI	BA+SB+GA	5,948.4	2,188.9	3,759.5
XII	BA+SC+GA	5,948.4	2,266.6	3,681.8
XIII	BA+SD+GA	5,948.4	2,213.8	3,734.6
XIV	BA+SE+GB	5,948.4	2,462.6	3,485.8
XV	BA+SA+GC	5,948.4	2,277.4	3,671.0
XVI	BA+SB+GC	5,948.4	2,221.2	3,727.2
XVII	BA+SC+GC	5,948.4	2,298.9	3,649.5
XVIII	BA+SD+GC	5,948.4	2,246.1	3,702.3

The result of the analysis shown in Table XV is that net benefits are maximized by Plan XI, with net average annual NED benefits of \$3,759,500 and a benefit to cost ratio of 2.7 to 1. The net average annual benefits, totaling \$508,600, from the Snake Bayou channel and the channel improvements above the turning basin and extending above the Highway 188 bridge are included in this table.

C. RECOMMENDED PLAN. Based upon the results of economic, engineering and environmental analyses of over 100 alternative plans evaluated for the Bayou La Batre Feasibility Study, alternative Plan XI, with the Snake Bayou channel segment and channel improvements above the turning basin in Bayou La Batre, reasonably maximizes net NED benefits and is the recommended plan for the project. The features of this plan are:

- o Deepening the existing 12' x 100' Federal channel from the mouth of Bayou La Batre (130+00) to the turning basin (30+00) to a navigation depth of 18 feet, plus an additional one foot for advance maintenance and one foot for allowable overdepth.
- o Deepening the existing 12' x 75' Federal channel from the turning basin (30+00) to the Highway 188 bridge (0+00) to a navigation depth of 14 feet plus one foot advance maintenance and one foot allowable overdepth.
- o Extending a 14' x 75' channel from the Highway 188 bridge (0+00) to Sta. -15+10 above the bridge.
- o Extending a 14' x 50' channel from the intersection of Snake Bayou and Bayou La Batre at the turning basin (Sta. 0+00 for Snake Bayou) into Snake Bayou to Sta. 5+33, then a 12' x 50' channel from Sta. 5+33 to Sta. 13+47.
- o Deepening, widening and extending the existing 12' x 100' Federal channel within Mississippi Sound south to connect with the Gulf Intracoastal Waterway (GIWW) alignment (536+00), then westward along the existing GIWW alignment and connecting with the existing Pascagoula Ship Channel (1185+45). The dimensions of this proposed channel are 18' x 120' with one foot each for advance maintenance and allowable overdepth.

The construction and maintenance dredged material disposal measures incorporated with this plan are:

- o New work dredged material from Snake Bayou and Bayou La Batre to Sta. 90+45 within Bayou La Batre would be disposed into a new 107-acre upland disposal area "Delta". New work dredged material from Sta. 90+45 within Bayou La Batre to the mouth (130+00) would be disposed into existing upland disposal area "Charlie". Maintenance dredged material from Snake Bayou and Bayou La Batre to Sta. 90+45 would be disposed into new upland disposal area "Delta". Maintenance dredged material from Sta. 90+45 to 155+00 would be disposed into existing upland disposal area "Charlie". See Figure 18, page 89, Main Feasibility Report.

- o New work dredged material disposal from the mouth of Bayou La Batre (130+00) to the GIWW alignment (536+00) would be split between the eastern shoreline of Isle aux Herbes and direct placement into open water greater than 12 feet deep to the west of the channel. Maintenance material from this segment would be disposed in open water greater than 12 feet deep west of the channel. This maintenance material would be disposed using thin layer technique. See Figure 19, page 90, Main Feasibility Report.
- o Direct placement of new work material and thin layer of maintenance dredged material from the GIWW channel segment, west to the Pascagoula Ship Channel, Sta. 536+00 to Sta. 1185+45, would be conducted in open water greater than 12 feet deep at a distance of 5,000 feet south of the channel.